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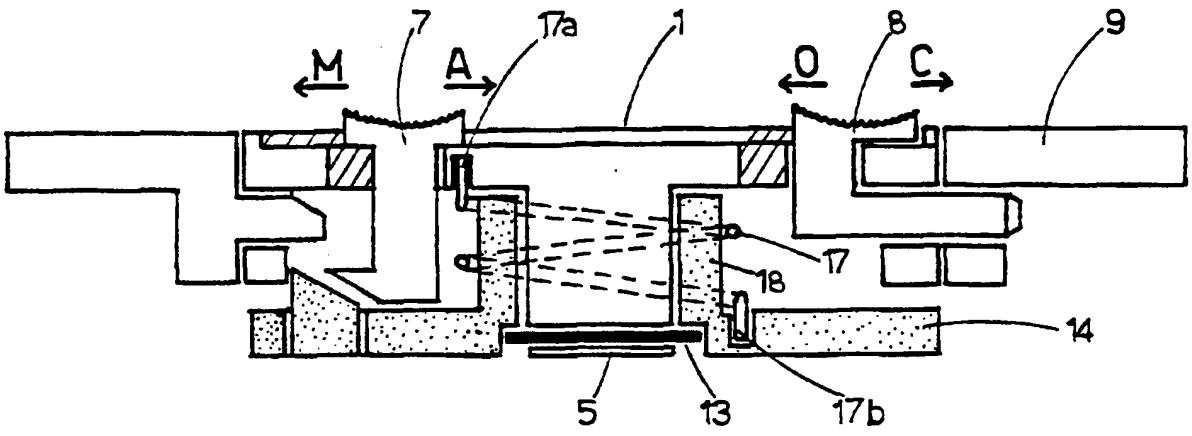

(57) Abstract

The crash helmet comprises an automatic opening and closing system of the visor which takes advantage of the pressure exerted by the air. A return spring maintains the visor (9) in its maximum aperture position when no external force is acting on it. When the velocity increases the pressure exerted by the air progressively rotates downwards the visor. The crash helmet also comprises a ventilation system (50, 60) which makes use of a minimum number of slits or holes on the shell, thereby lowering in a noticeable manner the noise inside the crash helmet when the ventilation system is not operating. Lastly the crash helmet comprises an internal stuffing means (67) which is extremely practical with regard to its cleaning and its adaptation to the particular form of the head, and which is also characterized in that it provides regions for the free circulation or air inside the crash helmet.

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Description

Crash helmet for motor-cyclists

Technical Field

The present invention relates to a crash helmet for motor-cyclists and in particular to a crash helmet having an automatic system for opening and closing the visor, and including many other advantages, as for example a much more efficient ventilation i.e. air circulation system, with a very limited noise inside the crash helmet when all ventilation holes and slits have been closed, and a system for engaging the visor, which is extremely easy to use, and lastly, an improved internal stuffing means.

Background Art

The difficulty in assembling and removing the visor of crash helmets is known. This operation is very often carried out using one or more screws or engaging systems, which are particularly complicated. Since the replacement of the visor is an operation which is very often done by the motor cyclist, for example in order to replace the visor with a darker one in the summer, or with one which does not get tarnished, during the winter, the present invention intends to overcome the aforesaid drawback, by providing an engaging system which has a simple construction and which is easy to use.

Another object of the present invention is that of allowing an automatic opening and closing of the visor, by particularly simple means. In fact, it is known that the crash helmet during warm seasons is particularly uncomfortable due to the heat which is present inside the crash helmet. This drawback is particularly noticed when the crash helmet is used in town, at low speeds, with repeated stops for example in front of traffic-lights.

In order to overcome this disadvantage, the motor cyclist must continuously open and close the visor, in order to let air enter inside the crash helmet for cooling.

This lowering and lifting movement of the visor is necessary because when a certain speed is exceeded, the visor must be closed again, since air which is in contact with the eyes disturbs the sight and makes the eyes water. However, this frequent operations of manually opening and closing the visor, which must be performed by taking off the hand from the handlebar, may be dangerous for the driving. Another feature of said automatic system, is that it can be rendered inoperative so that the usual manual control can be used instead.

Another object of the present invention is that of providing means which allow to cool or ventilate the interior of the crash helmet in order to increase comfort, expecially during the warm season, without need to lift the visor, said means allowing to obtain an

optimum silentness in the interior of the crash helmet when they are not used. The same means are also used in order to avoid the steaming up of the visor due to a temperature difference between the outside and the inside of the crash helmet. Usually, this problems have been solved using holes and slits of different kinds, which are provided on the front part of the crash helmet in order to allow and promote the flow of fresh air towards the inside, said holes and slits are often combined with holes or slits provided on the rear part of the crash helmet, which allow the extraction of warm air from the inside of the crash helmet.

However, these means invevitably have drawbacks due to their constructive complications and to the entrance of air (which causes noise inside the crash helmet) and of water, through the slits or the holes, notwithstanding the fact that there are provided small closing doors.

Disclosure of Invention

One object of the present invention is the realization of a system which limits at the most the number of holes on the external surface of the crash helmet, maintaining however the same ventilation efficiency with respect to conventional systems, or even improving it. Due to the reduced number of holes, the noise inside the crash helmet (measured in decibel) when the apertures of the present invention are closed, is much lower than that of conventional crash helmets.

Another object of the present invention is to render more handy the automatic movement of the visor and improve its air and water tightness. This is obtained by completing the automatic system with a noticeable innovation with regard to the seal. Until now, rubber or glued closed cell polyurethane foam has been used. The disadvantage of such solution is that rubber causes friction with respect to the visor, whereas the closed cell polyurethane foam glued on the shell cannot be replaced in order to adapt it to another type of visor.

Finally, the present invention has the object to provide means which allow the air to freely circulate inside the crush helmet when the visor is open, or in combination with the ventilation systems, in order to improve comfort and avoid perspiration, expecially during the warm seasons. These means will also allow to perform a periodic cleaning of the interior of the crash helmet, and will ensure an optimum adherence of the crash helmet's internal stuffing, which is also replaceable so as to conform to the geometrical configuration of every single head.

The present invention has also many other advantages which will become apparent from the following description.

Brief Description of Drawings

The objects of the present invention will be attained as

disclosed in the following detailed description of several embodiments thereof, which are represented in the annexed drawings, and which are illustrative and non-limitative.

The single figures show:

Fig. 1, a horizontal section of the ensemble which allows to engage the visor to the crash helmet and the manual or automatic opening/closing of the visor;

Figs. 1a, 1b, 1c, 1d, show single parts of the ensemble of Fig. 1, which allow to engage the visor to the crash helmet, or to change the control of the movement of the visor from automatic to manual;

Fig. 2, is a perspective exploded view of the ensemble of Fig. 1;

Figs. 3a and 3b show the base element fixed to the crash helmet, respectively in plan view and in side elevational view, making part of the ensemble of Fig. 1;

Figs. 4a and 4b, show that part of the visor connected to the cover, in a plan view and a sectional view along line A-A respectively, making part of the ensemble of Fig. 1;

Figs. 5a and 5b show the cover of the ensemble of Fig.

1, according to a plan view and a cross sectional view;

Figs. 6a and 6b, show the crash helmet of the invention which makes use of the ensemble of Fig. 1;

Figs. 7a and 7b, a variant of the automatic opening and closing system of the visor, according to another possible embodiment of the present invention, characterized in this case by having an external return spring;

Figs. 8a and 8b, show another crash helmet corresponding to another possible embodiment of the present invention;

Figs. 9a, 9b, 9c show the details of the opening and closing system of the visor for the crash helmet of Fig. 8a and 8b;

Figs. 10a, b, c show a crash helmet provided with a special kind of seal, which is also included in the present invention, and the blocking system for fixing the seal to the crash helmet;

Figs. 11a until 11e, show a system for obtaining a microaperture of the visor, which makes part of the ventilation, i.e. air circulation system, of the crash helmet of the present invention;

Figs. 12a-12f, show a lateral ventilation system of the crash helmet of the present invention;

Figs. 13a, b, c show a special kind of internal stuffing of the crash helmet of the invention.

Best Mode for carrying out the Invention

With reference to Figs, 1, 1a-1d and 2, the cylindrical cover 1 has an upper surface or wall 2, a lateral wall 3 provided with a slit 4, and a cylindrical part of pin 5 which is integral with the inner side of the upper surface 2 and coaxial with the lateral wall 3. This pin 5 is not visible in Fig. 2, because it is hidden inside the cover 1.

On the upper part, the cover 1 has a guide seat 6, for two sliders 7, 8, the first of them being connected to an element 7a having lower saw teeth 7b arranged along a circular sector. Fig. 1a shows the analogous arrangement to Fig. 1b, but reversed. The second slider 8 is rigidly connected, as shown in Fig. 1d, to a lower element 8b provided with a lateral projection 8b which is substantially flat.

The visor 9 is engaged on the cover 1 in the following manner: the lateral slit 4 receives the projection 10, this being made possible by the fact that the material which forms the visor 9 can be deformed.

Then, once the lateral cylindrical walls 11, 11' of the visor 9 and the lateral cylindrical walls of the cover 3

are in a abutting position the slider 8 is displaced to the left until it passes through a slit on the lateral wall of the cover 1, by means of the flat portion 8b which completely enters into the slit 12 on the lateral cylindrical wall 11' of the visor. The slider 8 will then be located in the position "closed" in fig. 2. Therefore the visor 9 is engaged on the crash helmet quickly and easily.

Obviously, this just described embodiment may be modified in different ways; for example, two sliders could be provided, corresponding to the slider 8, in order to engage the visor 9 on the cover 1, the flat portions of said sliders, corresponding to 8b, would be introduced in two slits (for example diametrically opposite ones) provided on the cover 1 (corresponding to the slit 12), whereas a third slider (corresponding to the slider 7) would serve for the conversion of the control of the visor's movement from "automatic" to "manual" or viceversa. The pin 5 inside the cover 1 is introduced into the cylindrical hole 19 of a hollow cylindrical portion 18 integral with the base element 14, being fixed preferably by means of a snap ring 13 to said base element 14, which by means of screws 15, 15' is in its turn fixed to the crash helmet, these screws 15, 15' passing through slots 16, 16' which during assembling allow an adjustment of the position of the visor 9 with respect to the crash helmet.

A helicoidal spring 17 is fixed at its ends 17a and 17b

to the cover 1 and to the base element 14 respectively, and its arrangement is coaxial with the hollow cylinder 18.

The base element 14 has an elastic tongue or sector 20 provided with one or more teeth which engage, when the slider 7 is pushed to the left in Fig. 2, respective saw teeth 7b of the lower element 7a; that is when the slider 7 is in the position "manual". When the slider 7 is pushed to the right in Fig. 2, that is to the "automatic" position, the sector 20 does no more engage the saw teeth 7b.

Obviously, all the elements making up the ensemble of Figs. 1 and 2 may be present both on the right side as on the left side of the crash helmet.

When the user decides to push the slider 7 towards the position "automatic" (Fig. 1, translation in the direction of the arrow A), the spring 17 pushes the visor in the position shown in Fig. 6a, when external forces are absent, or if these are small, when the user is driving for example at a reduced speed and the pressure of the air, as indicated by the arrow A, is not strong enough to lower the visor. When the speed increases, the pressure of the air becomes important (arrow B of Fig. 6b) and the visor 9 will progressively rotate downwards while the spring 17 is progressively twisted, until the visor 9 is completely closed. In this way, in the position "automatic" the opening and the closing of the visor will occur in a more or less

pronounced manner, depending on the velocity of the motor cyclist. He will not have its sight disturbed at high speeds, whereas in front of traffic-lights and during stops the visor 9 will automatically open.

In the Fis. 1 and 5b, the arrows M, A, C, O indicate respectively the translational directions of the sliders 7 and 8, towards the positions "manual", "automatic", "closed", "open", respectively.

The number 21 indicates a plurality of holes which allow to fix the lower end 17b of the spring in different positions, adjusting in this way the exact velocity which allows the visor to rotate downwards, according to the wish of the user.

The Fig. 7a shows a system in which the pulling force or traction of a helicoidal spring 22 is used instead of its twisting. The spring 22 is connected to the crash helmet by a pin or screw 23, at one of its ends, whereas at its other end it is connected to a hook 25 having a threaded end 26 inserted in a micrometer screw 24 which allows to adjust in a precise way the initial tension of the spring 22. The micrometer screw 24 is integral with the cover 27 which corresponds to the cover 1 of the preceding embodiment. Both in the preceding embodiment, as in this embodiment, the covers 27 and 1 may be connected to the respective base element, by the interposition of bearings 28. These bearings will promote an even more free sliding of the visor.

It follows, moreover, that the present invention has the

advantage that projections or recesses with respect to the visor are absent, that is all embodiments have parts which are flush with the visor.

This has the advantage of providing a better streamline and better safety conditions in case of falling, since there are no grips.

In the figures 8a, 8b, 9a, 9b, 9c, a further embodiment of the present invention is shown.

The visor 9 is connected to two lifting arms 29, 29' which are hinged on a support 30 which is for example fixed by means of screws 31, 31' to the rear part of the crash helmet. On an intermediate axis between the two lifting arms 29, 29', there is arranged a helicoidal spring 32, whose one end 34 is fixed to the suppot 30, the latter being stationary and fixed on the crash helmet, whereas the other end of the spring 32 is integral with the intermediate axis.

There is also a cylindrical element 33 having saw teeth as generating lines, which is also integral with said intermediate axis. A cover 37, which is fixed by means of screws 37a on the crash helmet, at the points 38, covers the lifting arms 29, 29' and the support 30. On the cover 37, on the region shown in Fig. 9a, there is arranged a slider which slides along a corresponding slit, said slider being integral with a tongue or leaf spring 36, which when the slider 35 is shifted in the direction of the arrow E, will engage the saw teeth of the cylindrical element 33, whereas in the opposite

direction, the leaf spring 36 will disengage itself from the cylindrical element 33.

The cover 37 has obviously a protective function, and it serves also to optimize the streamline of the crash helmet.

When the user decides to change over to the automatic operation, he shifts the slider 35 in the direction of the arrow F, so that the spring 32 will lift the visor 9 to the position shown in Fig. 8a. According to the air resistance, the visor 9 will rotate downwards starting from this position, and will lift again automatically when the motor cylist will lower its speed.

The manual control, on the other hand, is characterized in that the leaf spring engages a groove between two saw teeth, thus blocking the visor in a predetermined generic position, and by displacing the visor with his hand upwards or downwards, the user will hear a series of clicks when the leaf spring passes over successive grooves. The action of the spring, which renders automatic the movement of the visor, will therefore be cancelled.

This latter embodiment has the further advantage that the visor, by rotating on a larger radius, will position itself at the point of maximum aperture, in a location almost parallel to the shell, thus avoiding aerodynamic problems by which the crash helmet tends to overturn, and increasing the comfort when the user is driving with the visor in the lifted position.

Also in this case, the system has not only its control parts concentrated in a unique position, but it is conceived in order to be completely flush with the visor, avoiding projections which could influence the streamline properties and the safety properties of the crash helmet.

Figs. 10a, 10b and 10c show the crash helmet of the present invention, provided with a seal 40 along the edge of the front aperture of the crash helmet. The seal 40 is made of two separable parts, the first part being directly fixed to the shell 41 so as to be stationary, and being formed by a seal 42 of moulded plastic material, while the second part is engaged by means of its projection 44 inside the groove 45 having a complementary form. Since the seal of closed cell polyurethane foam will have a rectilinear development shorter than that of the rigid seal, once it is engaged in the groove 45 it will not spontaneously get out of the groove. The second seal 43 is made by closed cell polyurethane foam, commonly called mousse or aerstop. The seal 42 is formed by a ridig or almost rigid material, whereas the seal 43 has the opposite property, that is it conforms perfectly to the inner contour of the visor thus ensuring a perfect tightness with respect to air and water, without however causing friction which would damage the seal itself and would render more difficult the movement of the visor 9. Therefore, the seal 40 which forms part of the present invention,

facilitates the automatic movement of the visor and improves tightness with respect to water and air. Its advantages are due to the ease in removing and replacing the seal 43 which forms an annular element of closed cell polyurethane foam, since polyurethane foam conforms perfectly to the contour of the visor and must therefore be replaced when the visor is replaced.

The new features are therefore included in the combination of a rigid seal and a separable seal of closed cell polyurethane foam, and in the relative assembling method.

It will now be described a part of the improved ventilation system of the present invention.

Figs. 11a and 11b show a double slider 50, which is arranged as indicated in Fig. 11e, centrally and on the front part of the crash helmet, immediately below the visor 9. By displacing the central slider 51 upwards, the lower edge of the visor 9 will be lifted by a very small amount (Figs. 11b and 11d) allowing the air to flow (Q) towards the inside of the crash helmet and to be immediately after deviated upwards due to the particular configuration assumed in this case by the seal 42 (Fig. 11d). The air (Q) can therefore eliminate the steaming up of the visor 9 during the winter. The control of the cental slider is a micrometric control and an immediately accessible one.

In Fig. 11c there is shown the function of the external slider 52. After a displacement along an appropriate

guide, this slider will block the visor by means of the projection 53 (the arrow L indicates the displacement direction of the slider 52, and the arrow M indicates the fact that the visor cannot lift). When the user is driving on a straight road which allows him to proceed at a very high speed it is advised to use the slider 52. In fact, if he had previously selected the "automatic" operation, since he was driving in town, once he drives out of town, for example on entering a motor-way, the visor automatically closes because of the high pressure of the air; but if he unconsciously turns his head to the right or to the left, or upwards, the visor could immediately lift itself, with detrimental effects if the automatical operation has not been previously rendered inoperative by selecting the manual operation.

Because of this, the present invention provides a directly accessible control means which blocks the visor.

The ventilation system of the crash helmet of the invention is completed by two movable channels 60 which are mounted by means of pins 62 in two hollow parts 61 which are located in appropriate seats 63 (Figs. 12a-12f). In Fig. 12e there is shown only one side of the crash helmet, while the other side is obviously symmetric and has another movable channel 60 for the ventilation.

In Fig. 12c and 12d the arrow D indicates the direction of motion. In the first case (Fig. 12c), the movable

channel 60 allows the air to enter inside the crash helmet, whereas in the second case (Fig. 12d) the movable channel 60 is in the extraction position. The changeover from one position to the other is performed easily by a finger tip. In both cases the arrow A indicates the flow direction of the air with respect to the crash helmet. The number 64 indicates the polystyrene layer, which is crossed by channels 65, 66. In Fig. 12c the air passes through the channel 66 in the direction of the arrow B, while in Fig. 12d it passes through the channel 65, being directed towards the outlet.

Figs. 12e and 12f show the possible position of the ventilation means on the crash helmet.

This ventilation system has obviously the advantage that only two apertures are present on the shell.

In conventional crash helmets, usually there are two apertures on the two front sides for the introduction of air, and two apertures on the two rear sides for the extraction of air. This increases the noise in the interior of the crash helmet and the possible amount of water and air entering in the interior of the crash helmet. The system of the invention has also the advantage of having its apertures located in a lateral position, and consequently, there results a smaller probability for the air and water to enter when they are closed.

Fig. 13a, b, c show a new stuffing system. Below the

polystyrene layer 64 there are small cushions 67 which contain a gel, for example, and which are arranged in appropriate seats which are obtained in the polystyrene layer. They are fixed for example by means of a fastener of a textile type 68 (velcro R) in the respective seats, as shown in Fig. 13b, which shows a vertical section along the symmetry plane of the crash helmet. The system has the following advantages: it prevents the head from abutting completely on the interior of the shell, always leaving out spaces for the passage of air; the cushions may easily be removed and cleaned; the cushions may be replaced easily with other ones having a different thickness in order to perfectly adapt the crash helmet to the form of the head.

In the solutions of the prior art, the stuffing means do not allow the circulation of air, and being composed of a unique or at most two structures, they are not perfectly adaptable to different morphologies.

The present invention provides for the first time a stuffing means which can be removed and which, therefore, can be cleaned, and which, furthermore, leaves out air passages, being perfectly adaptable to the morphology of the head.

Claims

1. A crash helmet for motor cyclists, characterized in that it comprises a system for opening and closing the visor (9) with automatic and manual control, the automatic control allowing the visor (9) to lift and lower according to the velocity and the corresponding pressure excerted by the air against the force of a spring (17; 22; 32) which, when external forces acting on the visor (9) are absent, will rotate the latter in its position of maximum aperture, the visor rotating gradually downwards when the forces due to air pressure increase, until it reaches the closure position; the automatic control being such as to be cancelled by displacing a slider (7; 35) which engages blocking means (20; 33) which also allow a fine adjustment of the position of the visor (9).

2. A crash helmet for motor cyclists, characterized in that it comprises also an aeration system which includes two movable channels (60) arranged in seats (63) obtained on the shell, said movable channels providing a communication between the exterior of the crash helmet and a ventilation channel (66) or alternatively an air extraction channel (65), the user easily controlling by a finger tip the direction of the air flow in order to select the ventilation mode or the air extraction mode.

3. A crash helmet for motor cyclists, characterized in that it comprises a system for assembling and engaging the visor, including one or more sliders.

4. A crash helmet for motor cyclists, characterized in that it comprises a ventilation system which includes a means for lifting the visor (9) by a minimum predetermined distance, with a micrometric opening system (51) arranged immediately below the closed visor and in a central position.

5. A crash helmet for motor cyclists, characterized in that it comprises an internal stuffing means composed of a plurality of separate deformable cushions (67) which are arranged in spaced apart seats on the inner side of the shell.

6. A crash helmet for motor cyclists, characterized in that it comprises a safety closure system of the visor composed of a slider (52) which is preferably arranged directly below the visor (9), and which prevents lifting of the latter, through a projection (53).

7. A crash helmet for motor cyclist, characterized in that it comprises a seal (40) which includes two single seals (42, 43) arranged along the edge of the front aperture of the crash helmet, the first (42) of

said seals being fixed to said edge and being formed by a rigid material, preferably moulded plastics, the second (43) being formed by a deformable material with no elastic memory, preferably closed cell polyurethane foam, and being assembled to the first seal (42) in a removable way so as to be immediately replaceable in order to perfectly conform to the shape of the inner surface of the visor (9) which is used at the moment by the motor-cyclist.

8. A crash helmet for motor cyclists according to claim 1, characterized in that there are provided bearings in order to eliminate friction between a movable part connected to the visor (9) and a fixed part connected to the shell.

9. A crash helmet for motor cyclists according to claim 1, characterized in that it has its visor hinged on an axis which is located on the rear side of the crash helmet and which can therefore rotate on a larger radius.

10. A crash helmet according to claim 1 and 8, characterized in that there are provided means (21, 24) for adjusting the initial biasing force of the spring (17; 22; 32), when the visor (9) is completely open, so as to vary the exact velocity which allows the downward rotation of the visor (9).

11. A crash helmet according to claims 1, 8 and 10, characterized in that it comprises a shell on which there is assembled a base element (14) having a central projection in the form of a hollow cylinder (18), a pin (5) integral with a cover (1) being introduced in the aperture (19) of said hollow cylinder and fixed to the base element preferably by means of a snap ring (13), a helicoidal spring (17) being fixed between the base element (14) and the cover (1), around the hollow cylinder (18), the visor (9) of the crash helmet being engaged around the cover by means of a projection (10) integral with the visor, which is inserted into a slit (4) of the cover (1), while a flat projection (8b) is pushed through the diametrically opposite side of the cover (1) by means of a slider (8), said flat projection being also inserted in a slit (12) on a lateral cylindrical wall (11') integral with the visor and opposite to the lateral cylindrical wall (11) comprising the projection (10) integral with the visor (9); the cover (1) comprising further a second slider (7) which comprises on its lower part a saw teeth sector (7b) which engages another saw teeth sector (20) integral with the base element (14) when the user displaces this latter slider (7) in a certain direction thereby changing over from the automatic control of the visor's movement, to the manual one.

12. A crash helmet for motor cyclists, according to any of the claims 1, 9 and 10, characterized in that it comprises a shell on whose rear side there is assembled a support (30) whereon there is hinged an ensemble formed by two lifting arms (29, 29') of the visor (9) and by an intermediate rectilinear axis, the latter being integral and coaxial with a cylindrical element (33) having saw teeth as generating lines, a helicoidal spring (32) being fixed at one of its ends to said support (30) and at its other end to said intermediate rectlinear axis, a cover (37) provided externally with a slider (35) being assembled on the shell so as to cover up said lifting arms (29, 29') of the visor, said rectilinear intermediate axis, and said support (30); said slider (35) engaging the grooves between the saw teeth of said cylindrical element (33) through a leaf spring (36) integral with said slider (35), said cover (37) being completely flush with the visor (9), the visor (9) being substantially parallel to the shell in its maximum aperture position so as to prevent a possible turnover of the crash helmet.

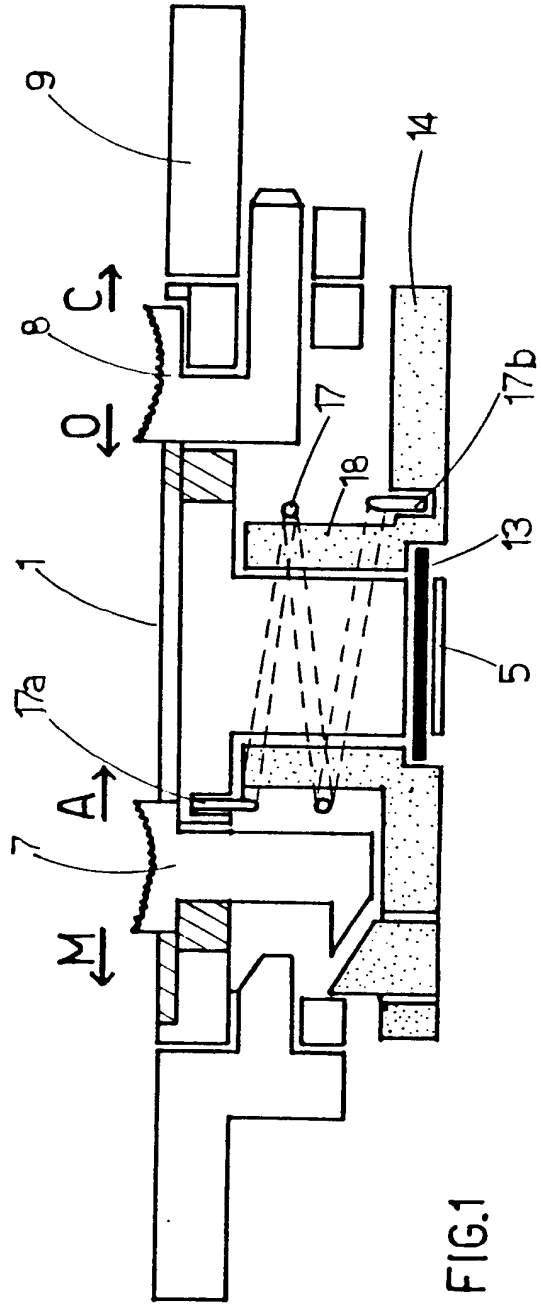


FIG.1

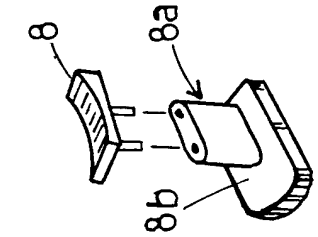


FIG. 1d

FIG. 1c

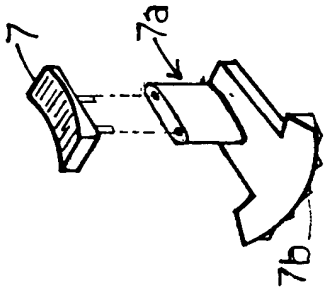


FIG. 1b

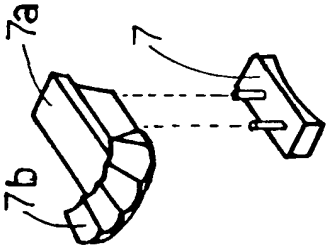
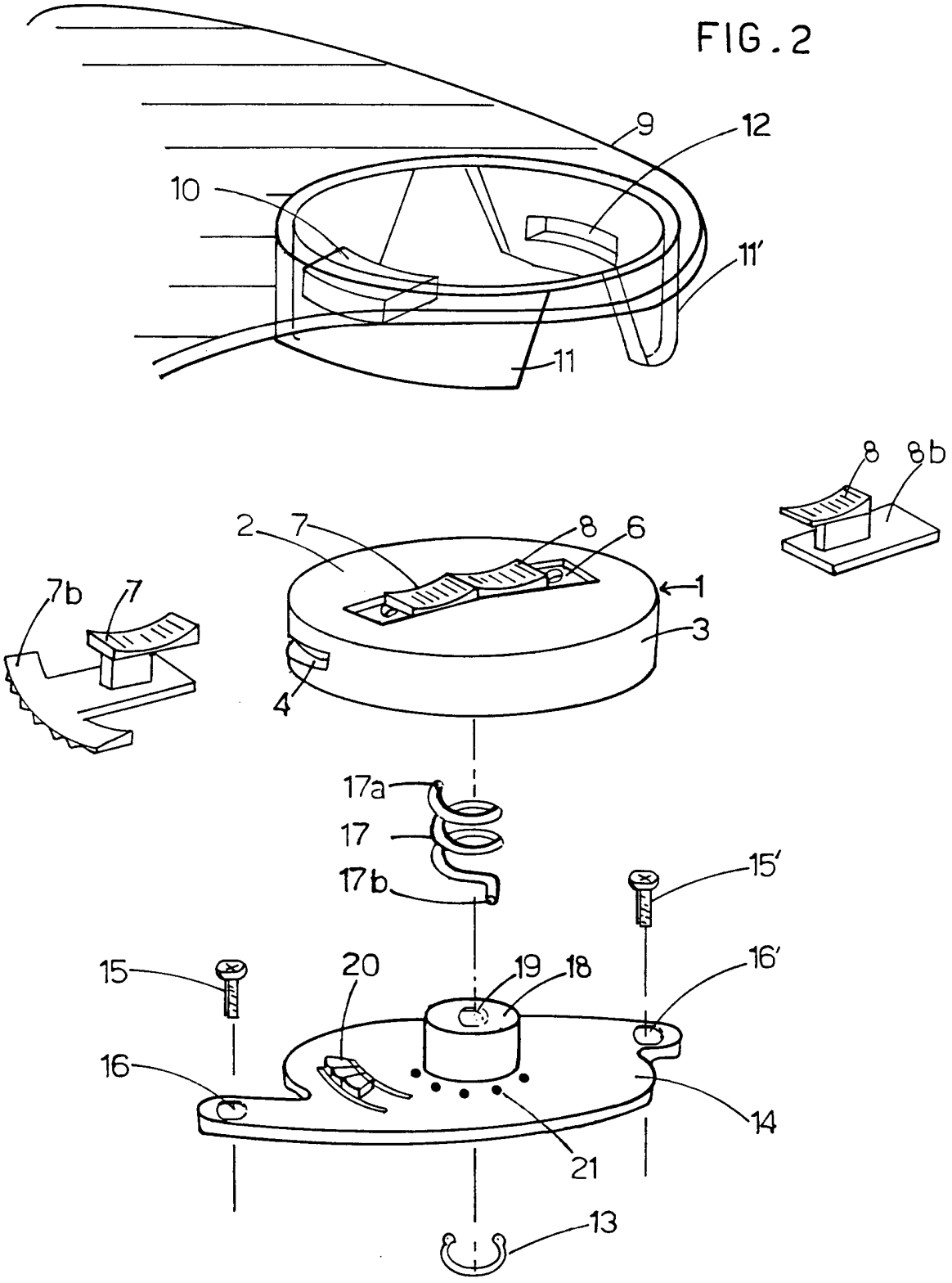


FIG. 1a

FIG. 2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12
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8b
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13

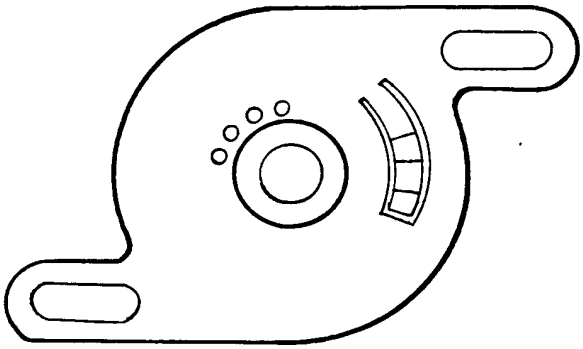


FIG. 3a

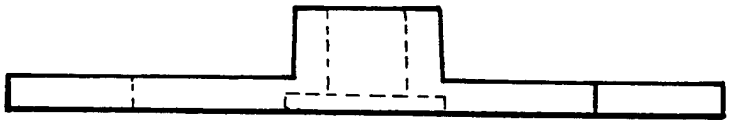


FIG. 3b

FIG 4b

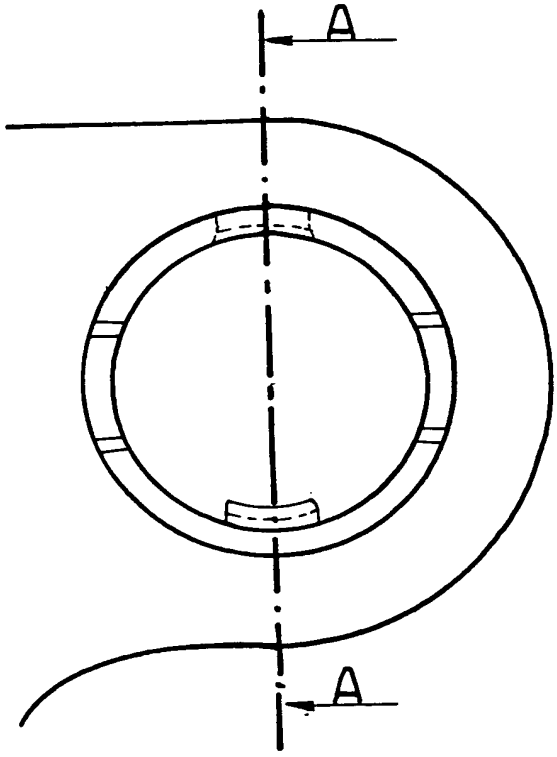


FIG 4a

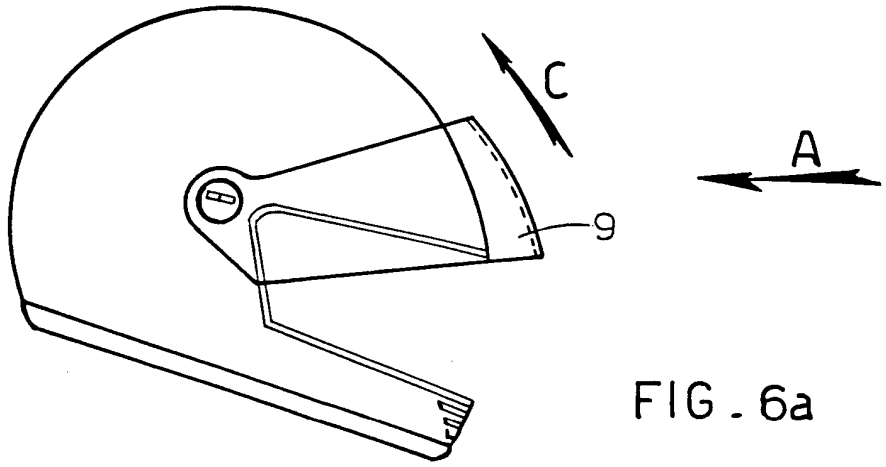


FIG. 6a

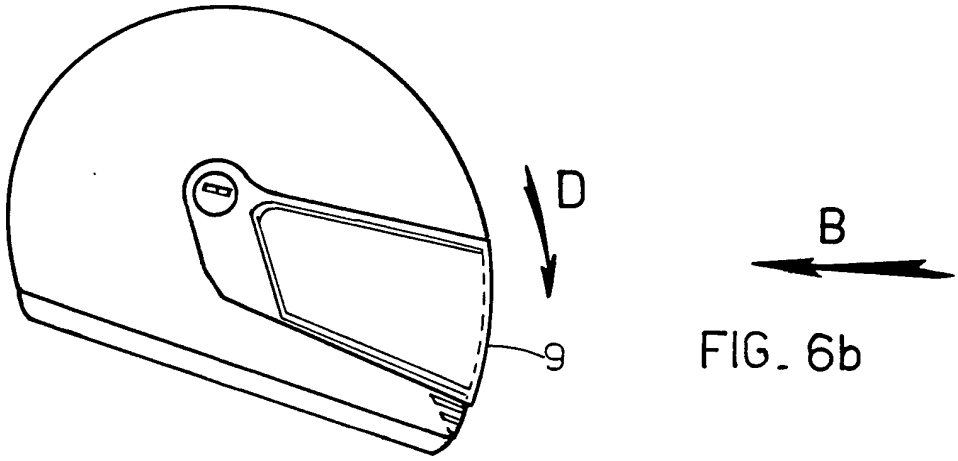


FIG. 6b

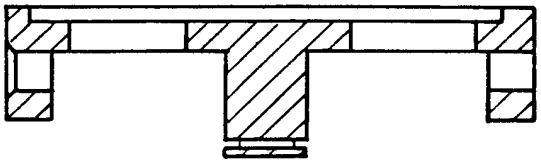


FIG. 5a

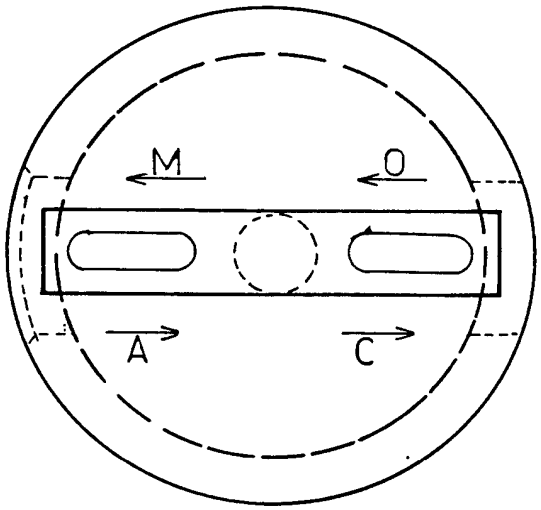


FIG. 5b

FIG. 7a

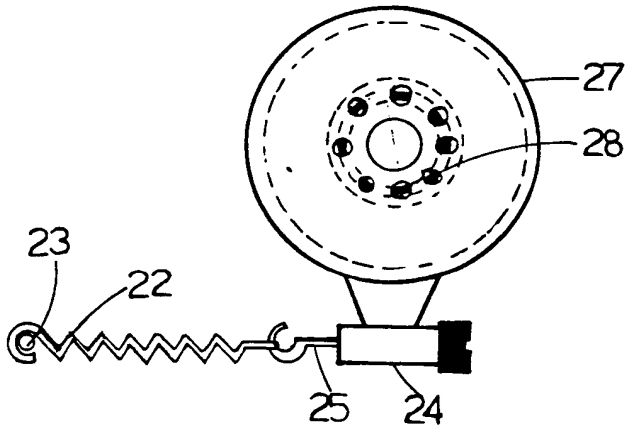


FIG. 7b

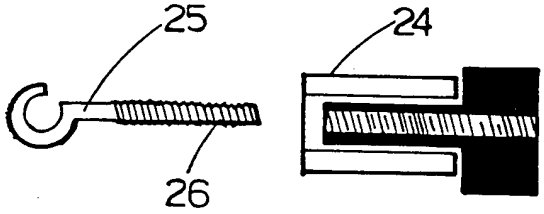


FIG. 8a

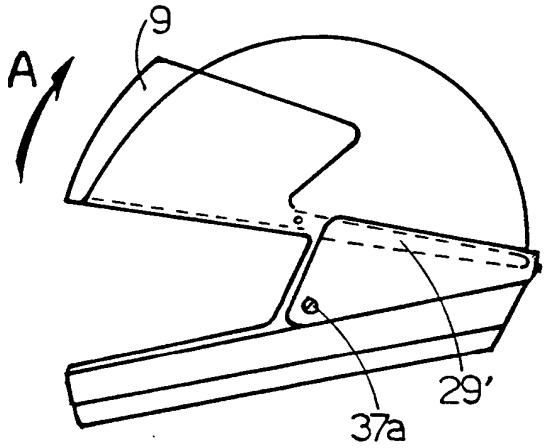


FIG 8b

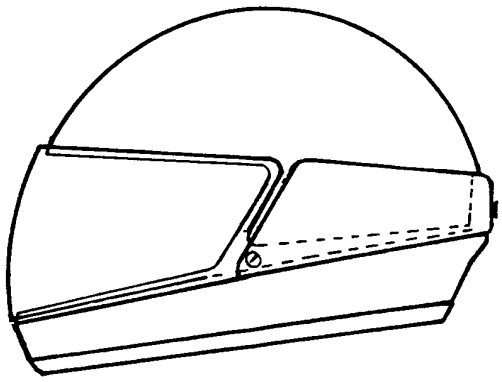


FIG. 9a

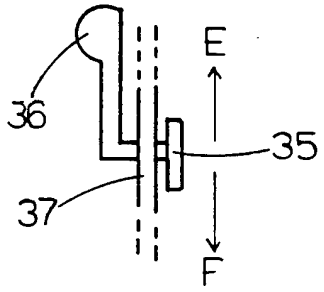


FIG. 9b

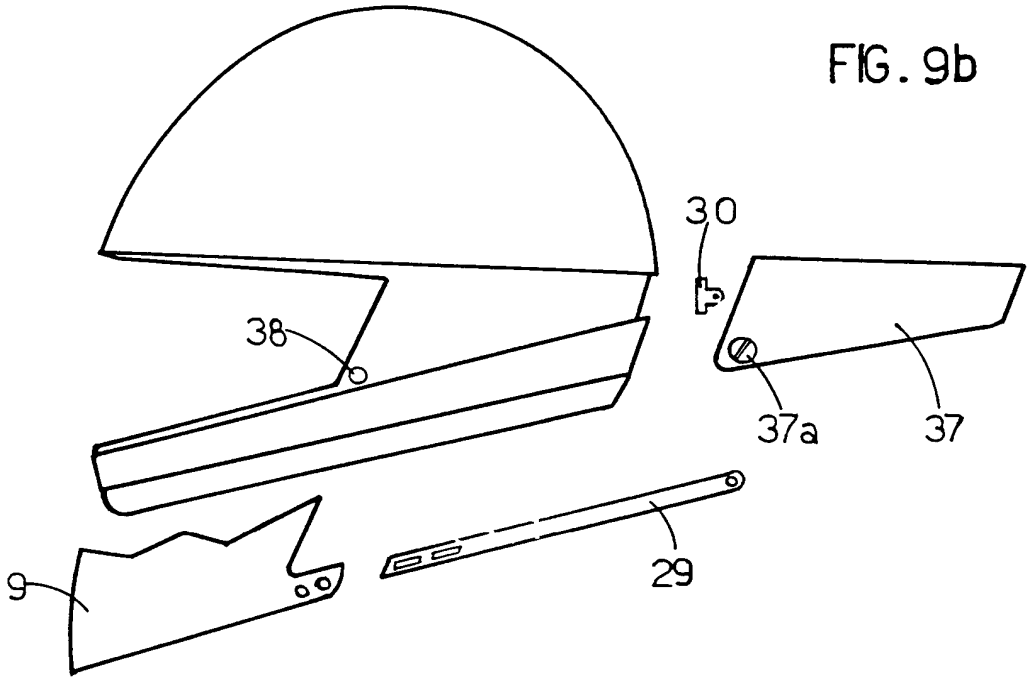


FIG. 9c

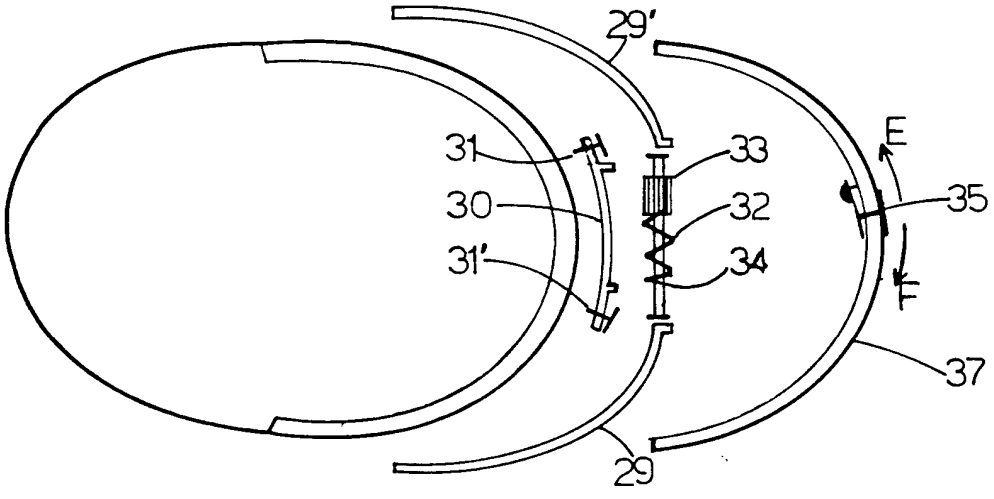


FIG. 10a

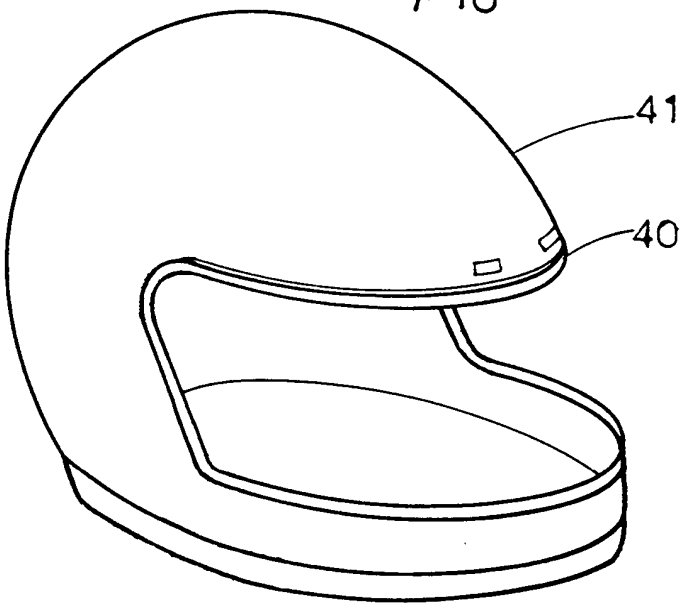


FIG. 10c

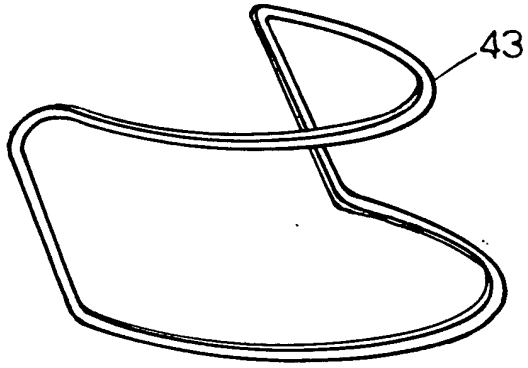


FIG. 10b

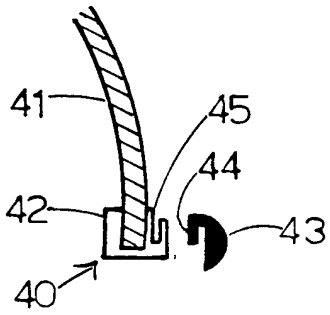


FIG. 11b

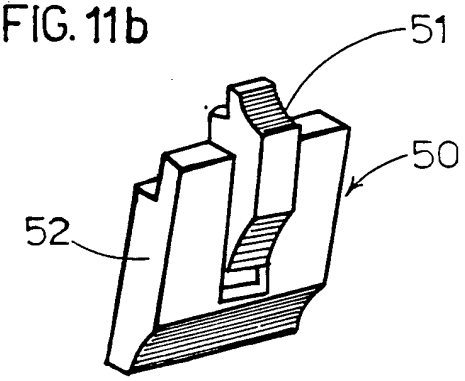
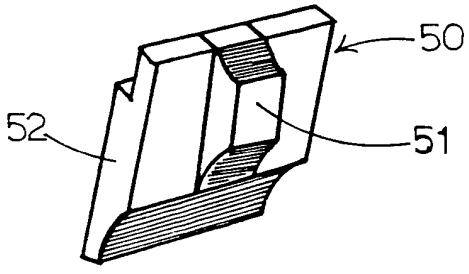


FIG. 11a



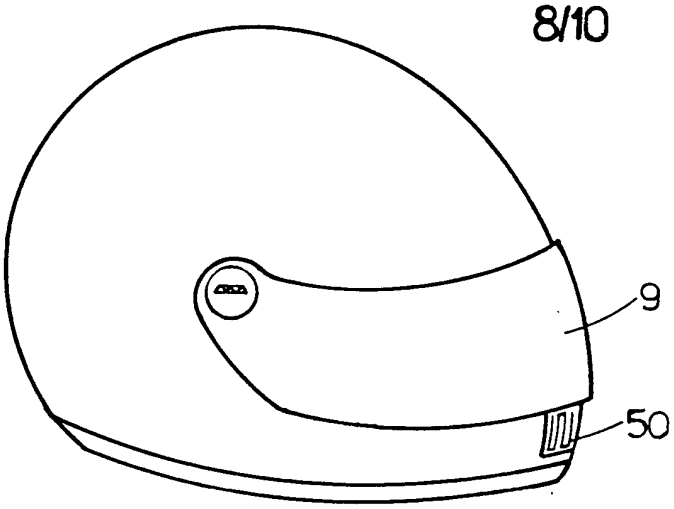


FIG. 11e

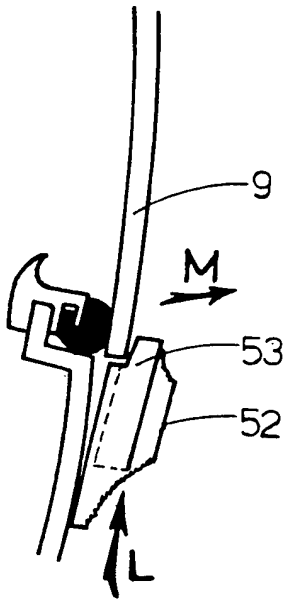


FIG. 11c

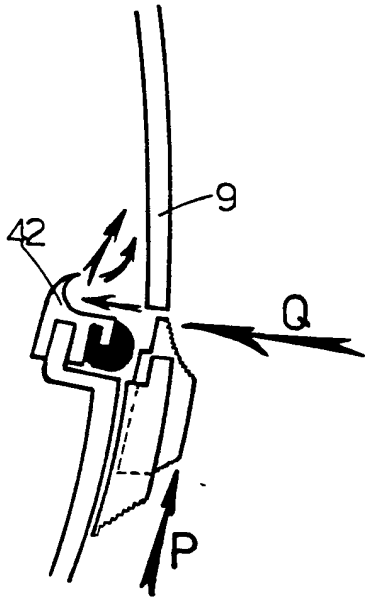


FIG. 11d

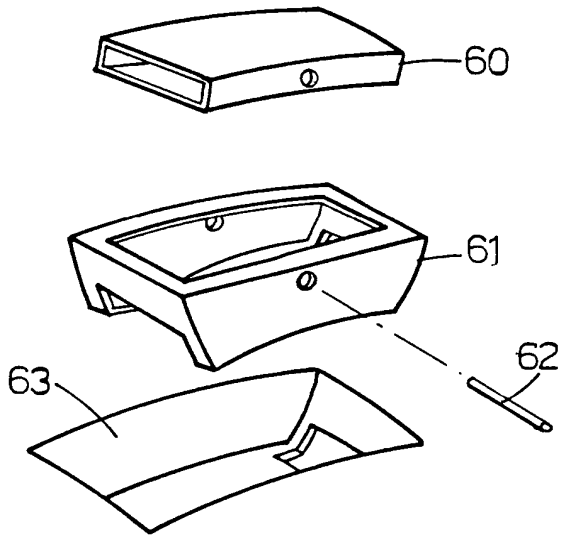


FIG. 12a

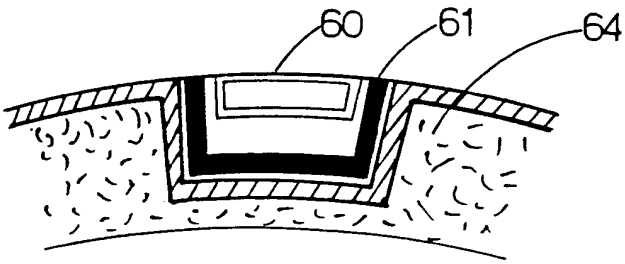


FIG. 12b

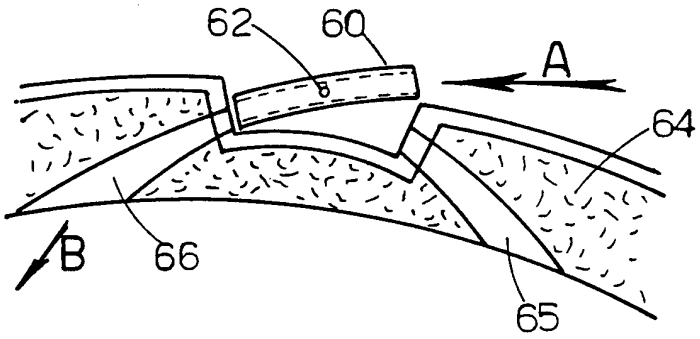


FIG. 12c

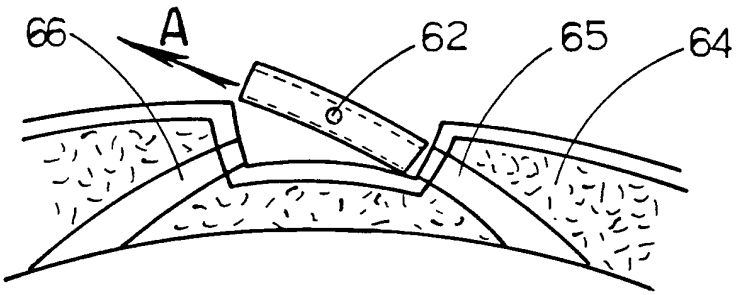


FIG. 12d

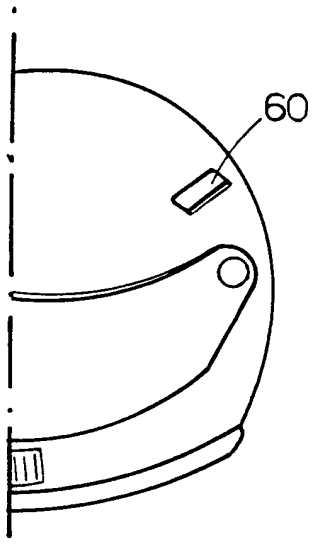


FIG. 12e

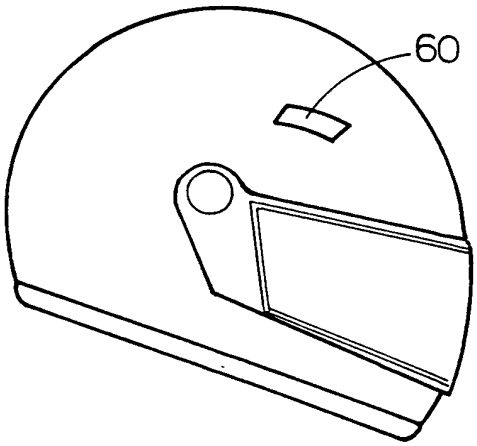


FIG. 12f

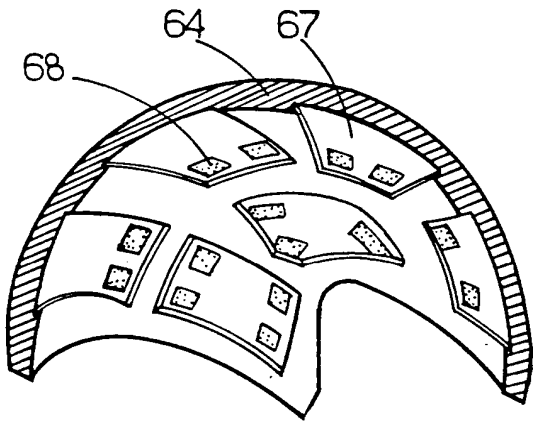


FIG. 13a

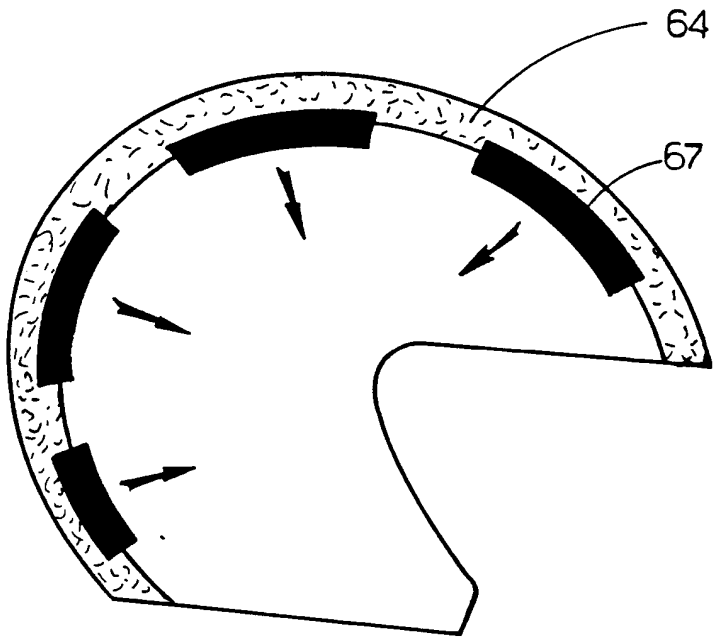


FIG. 13b

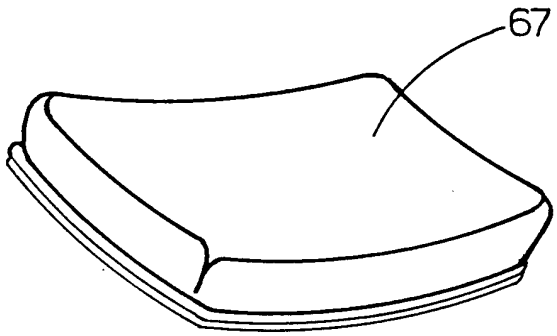


FIG. 13c

INTERNATIONAL SEARCH REPORT

Inten. nal Application No
PCT/IT 94/00044

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A42B3/22 A42B3/28 A42B3/10 A42B3/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A42B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR,A,2 402 455 (T. SCHOTT) 6 April 1979 see the whole document ---	1,8
A	FR,A,2 541 092 (NOLAN S.P.A.) 24 August 1984 see the whole document ---	1,8
X	DE,A,34 07 403 (SCHUBERTH-WERK GMBH & CO KG) 29 August 1985 see the whole document ---	2
X	US,A,4 612 675 (L. V. BROERSMA) 23 September 1986 see column 4, line 10 - line 64; figures 2,10,13-15 --- -/--	4

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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1

Date of the actual completion of the international search	Date of mailing of the international search report
8 December 1994	03. 01. 95

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	BOURSEAU, A

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INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/IT 94/00044

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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X	EP,A,0 287 145 (T.A.C. TONGERESE AUTOMATEN CENTRALE) 19 October 1988 see abstract; claims 1-5; figures 1-3	4
X	US,A,4 434 514 (J. G. SUNDAHL ET AL.) 6 March 1984 see column 3, line 60 - line 68; figures 3,8	5
X	FR,A,2 553 266 (NOLAN S.P.A.) 19 April 1985 see abstract; claim 1; figure 1	5
A	US,A,4 133 055 (W. H. ZEBUHR) 9 January 1979	
A	DE,U,93 12 632 (E. HOTZ) 28 October 1993	
X	DE,A,32 29 430 (NOLAN S.P.A.) 24 March 1983 see page 7, line 28 - page 8, line 18 see page 8, line 31 - page 9, line 5 see claims 1-3; figure 1	6
A	EP,A,0 471 907 (SHOEI KAKO KABUSHIKI KAISHA) 26 February 1992 see abstract; figures	7
A	EP,A,0 477 150 (P. L. NAVA) 25 March 1992 see column 2, line 23 - line 40; figure 2	7
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A	EP,A,0 471 906 (SHOEI KAKO KABUSHIKI KAISHA) 26 February 1992 see abstract; figures	11
A	FR,A,2 482 836 (NOLAN S.P.A.) 27 November 1981	
A	WO,A,86 01694 (A. FÖHL) 27 March 1986	

1

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PCT/IT 94/00044

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information on patent family members

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PCT/IT 94/00044

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WO-A-8601694		AU-A- 4860785	08-04-86
		EP-A,B 0197058	15-10-86